

Amendments to the Claims

The following Listing of Claims, in which deleted text appears ~~struck through~~ or [[double-bracketed]] and inserted text appears underlined, will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) An isolated nucleic acid molecule having antisense activity comprising:

(i) a nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide, or

(ii) a nucleic acid sequence having at least 70% homology to (i),

wherein the nucleic acid is introduced into a rice plant cell expressing the prolamin polypeptide, and the antisense activity reduces the amount of expression of the prolamin polypeptide relative to a rice plant to which the nucleic acid was not introduced, and wherein the nucleic acid is operably linked in antisense orientation to a promoter that functions in a prolamin is of rice plant.

2. (Previously presented) The nucleic acid molecule according to claim 1 comprising said nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide.

3. Canceled.

4. (Withdrawn) The nucleic acid molecule according to claim 1, wherein the prolamin is of japonica rice.

5. (Previously presented) The nucleic acid molecule according to claim 1, wherein the nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide is at least 50 nucleotides in length.

6. (Previously presented) The nucleic acid molecule according to claim 1, wherein the nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide comprises a full length sequence encoding the prolamin polypeptide.

7. (Withdrawn) The nucleic acid molecule according to claim 1, wherein the nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide is a 5' terminal nucleic acid sequence encoding the prolamin polypeptide.

8. (Currently amended) The nucleic acid molecule according to claim 1, wherein the at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide, is a nucleotide length of 50 nucleotide or less.

9. (Currently amended) The nucleic acid molecule according to claim 1, wherein the at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide, is a nucleotide length of 30 nucleotide or less.

10. (Withdrawn - Currently amended) The nucleic acid molecule according to claim 1, wherein the at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide, comprises a sequence having at least 15 nucleotides of a nucleic acid sequence encoding an amino acid sequence selected from the group consisting of SEQ ID NOs; 98-101.

11. (Withdrawn) The nucleic acid molecule according to claim 1, wherein the prolamin is a 13 kDa prolamin.

12. (Withdrawn) The nucleic acid molecule according to claim 1, comprising a nucleic acid sequence of at least 15 contiguous nucleotides, complementary to:

(a) a polynucleotide having a nucleic acid sequence set forth in a SEQ ID NO, selected from the group consisting of SEQ ID NOs: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43 and 45, or a fragment sequence thereof;

(b) a polynucleotide encoding a polypeptide having an amino acid sequence set forth in SEQ ID NO: selected from the group consisting of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44 and 46, or a fragment sequence thereof;

(c) a polynucleotide encoding a polypeptide variant having at least one mutation selected from the group consisting of one or more amino acid substitution, addition and deletion in an amino acid sequence set forth in SEQ ID NO: selected from the group consisting of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44 and 46, and having a biological activity;

(d) a polynucleotide of an allelic variant of a DNA consisting of a nucleic acid sequence set forth in a SEQ ID NO, selected from the group consisting of SEQ ID NOs: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43 and 45;

(e) a polynucleotide encoding a species homolog or an ortholog of a polypeptide consisting of an amino acid sequence set forth in SEQ ID NO: selected from the group consisting of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44 and 46;

(f) a polynucleotide hybridizing to at least one polynucleotide of any of (a)-(e), and encoding a polypeptide having a biological activity; or

(g) a polynucleotide consisting of a base sequence having at least 70% identity with at least one polynucleotide of (a)-(e) or a complementary sequence thereof, and encoding a polypeptide having a biological activity.

Claims 13-15. Canceled.

16. (Withdrawn) An agent causing RNA interference (RNAi) in rice comprising:

A nucleic acid sequence (A) comprising:

(i) a nucleic acid sequence having at least 15 contiguous nucleotides of a gene encoding a prolamin polypeptide, or

(ii) a nucleic acid sequence having at least 70% homology to (i); and

a nucleic acid sequence (B) comprising:

(iii) a nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide, or

(iv) a nucleic acid sequence having at least 70% homology to (iii).

17. (Withdrawn) The nucleic acid molecule according to claim 16, wherein the nucleic acid sequence (A) and the nucleic acid sequence (B) have a portion complementary to each other.

18. (Withdrawn) The nucleic acid molecule according to claim 16, wherein the nucleic acid sequence (A) and the nucleic acid sequence (B) are complementary to each other.

19. (Withdrawn) The nucleic acid molecule according to claim 16, further comprising a spacer sequence.

20. (Withdrawn) The nucleic acid molecule according to claim 19, wherein the spacer sequence comprises an intron sequence.

21. (Withdrawn) The nucleic acid molecule according to claim 19, wherein the space sequence is comprised between the nucleic acid sequence (A) and the nucleic acid sequence (B).

22. Canceled.

23. (Withdrawn - Currently amended) A nucleic acid cassette comprising a nucleic acid sequence (B) having antisense activity, comprising:

(i) a nucleic acid sequence having at least 15 contiguous nucleotides complementary to a gene encoding a prolamin polypeptide, or  
(ii) a nucleic acid sequence having at least about 70% homology to (i),  
wherein the nucleic acid cassette is introduced into a rice plant cell expressing the prolamin polypeptide, and the antisense activity of the nucleic acid cassette reduces the amount of expression of the prolamin polypeptide relative to a rice plant to which the nucleic acid was not introduced in rice.

24. (Withdrawn) The nucleic acid cassette according to claim 23, further comprising a nucleic acid sequence encoding a foreign gene.

25. (Withdrawn - Currently amended) The nucleic acid cassette according to claim 23, further comprising a nucleic acid sequence (A) comprising:

(i) a nucleic acid sequence having at least 15 contiguous nucleotides of a gene encoding a prolamin polypeptide, or  
(ii) a nucleic acid sequence having at least 70% homology to (i),

26. (Withdrawn) The nucleic acid cassette according to claim 25, further comprising a spacer sequence.

27. (Withdrawn) The nucleic acid cassette according to claim 26, wherein the spacer sequence comprises an intron sequence.

28. (Withdrawn - Currently amended) The nucleic acid cassette according to claim 26, wherein the spacer sequence is comprised between the nucleic acid sequence (A) and the nucleic acid sequence (B).

29. (Withdrawn) The nucleic acid cassette according to claim 24 or claim 25, further comprising a signal sequence.

30. (Withdrawn) The nucleic acid cassette according to claim 29, wherein the signal sequence is located upstream of the foreign gene.

31. (Withdrawn) The nucleic acid cassette according to claim 29, wherein the signal sequence is a signal sequence of a storage protein.

32. (Withdrawn) The nucleic acid sequence according to claim 29, wherein the signal sequence is a prolamin signal sequence.

33. (Withdrawn) The nucleic acid cassette according to claim 24, further comprising a promoter sequence.

34. (Withdrawn) The nucleic acid cassette according to claim 33, wherein the promoter sequence is operably linked to both the foreign gene and the nucleic acid sequence (B).

35. (Withdrawn) The nucleic acid cassette according to claim 24, wherein separate promoters are independently operably linked to the foreign gene and the nucleic acid (B).

36. (Withdrawn) The nucleic acid cassette according to claim 35, wherein a first promoter sequence is operably linked to the foreign gene, and a second promoter sequence is operably linked to the nucleic acid sequence (B), and the first and second promoter sequences are different to each other.

37. (Withdrawn - Currently amended) The nucleic acid cassette according to claim 36, wherein the second promoter sequence is a promoter promoting promotes expression in a high level in seeds.

38. (Withdrawn) The nucleic acid cassette according to claim 36, wherein the second promoter sequence is derived from a storage protein promoter.

39. Canceled.

40. (Withdrawn) The nucleic acid cassette according to claim 36 wherein the second promoter sequence is derived from a promoter selected from the group consisting of a polyubiquitin promoter, 26 kD globulin promoter, glutelin A promoter, glutelin B promoter, 16 kD prolamin promoter, 13 kD prolamin promoter and 10 kD prolamin promoter.

41. (Withdrawn) The nucleic acid cassette according to claim 36 wherein the first promoter sequence is derived from a storage protein promoter.

42. (Withdrawn) The nucleic acid cassette according to claim 36, wherein the first promoter sequence is a promoter sequence naturally associated with the nucleic acid sequence (B).

43. (Withdrawn) The nucleic acid cassette according to claim 36 wherein the first promoter sequence is derived from a promoter selected from the group consisting of 26 kD globulin promoter, glutelin A promoter, glutelin B promoter, 16 kD prolamin promoter, 13 kD prolamin promoter and 10 kD prolamin promoter.

44. (Withdrawn) The nucleic acid cassette according to claim 36, wherein the first promoter sequence is a prolamin promoter.

45. (Withdrawn) The nucleic acid cassette according to claim 36, wherein the first promoter sequence is derived from a prolamin promoter, and the second promoter sequence is derived from a promoter other than the prolamin promoter.

46. (Withdrawn) The nucleic acid cassette according to claim 33, comprising a signal sequence in frame between the foreign gene and the promoter sequence.

47. (Withdrawn) The nucleic acid cassette according to claim 25 further comprising a terminator sequence.

48. (Withdrawn) The nucleic acid cassette according to claim 47, wherein the terminator sequence is a terminator sequence of 10 kD prolamin.

49. (Withdrawn) The nucleic acid cassette according to claim 25, further comprising a foreign gene, and the foreign gene is located upstream of both the nucleic acid sequence (A) and the nucleic acid sequence (B).

50. (Withdrawn) The nucleic acid cassette according to claim 49 comprising a spacer sequence between the nucleic acid sequence (A) and the nucleic acid sequence (B).

51. (Withdrawn) The nucleic acid cassette according to claim 49 comprising an intron sequence between the nucleic acid sequence (A) and the nucleic acid sequence (B).

52. (Withdrawn) A method for producing a nucleic acid cassette comprising the steps of:

- A) providing a nucleic acid cassette according to claim 23;
- B) transforming a rice plant with the nucleic acid cassette; and

C) selecting a transformed rice plant having an amount of expression of prolamin that is partially reduced with respect to an untransformed rice plant.

53. (Withdrawn) A vector comprising the nucleic acid molecule according to claim 1.

54. (Withdrawn) The vector according to claim 53, further comprising a sequence having a promoter activity.

55. (Withdrawn) The vector according to claim 54, wherein the sequence having the promoter activity is a storage protein promoter.

56. (Withdrawn) The vector according to claim 53 wherein the sequence having the promoter activity is a promoter of prolamin.

57. (Withdrawn) The vector according to claim 53, further comprising a terminator.

58. (Withdrawn) The vector according to claim 53, further comprising a sequence encoding a selectable marker.

59. (Withdrawn) The vector according to claim 53, further comprising a sequence encoding a foreign gene different from the nucleic acid molecule according to claim 1.

60. (Withdrawn) A plant cell comprising the nucleic acid molecule according to claim 1.

61. (Withdrawn) The plant cell according to claim 60, further comprising a nucleic acid molecule encoding a foreign gene different from the nucleic acid molecule according to claim 1.

62. (Withdrawn) The plant cell according to claim 60, wherein the plant cell is from a rice species.

63. (Withdrawn) The plant cell according to claim 60 wherein the plant cell is from a rice species, and the species from which the prolamin is derived is the same variant.

64. Canceled.

65. (Withdrawn) The plant cell according to claim 60, wherein the species from which the prolamin is derived and the species of the plant are of a japonica rice.

66. (Withdrawn) The plant cell according to claim 60, having the nucleic acid molecule of claim 1 introduced in both alleles thereof.

67. (Withdrawn) A plant tissue comprising the plant cell according to claim 60.

68 - 76. Canceled.

77. (Withdrawn) A starch preparation produced from the rice plant cell according to claim 60.

78. (Withdrawn) A composition comprising a gene product of the foreign gene produced from the rice plant cell according to claim 61.

79. (Withdrawn) A method for reducing an expression amount of a protein in a seed of a rice plant, comprising the steps of:

- A) introducing the nucleic acid molecule of claim 1 into the rice plant cell;
- B) redifferentiating the cell to produce a transgenic rice plant; and
- C) obtaining a seed from the transgenic rice plant.

80. (Withdrawn) The method according to claim 79, wherein the step of introducing is performed by Agrobacterium method.

81. (Withdrawn) The method according to claim 79, further comprising the step of D) selecting a plant cell with the nucleic acid introduced therein.

82. (Withdrawn) The method according to claim 81, wherein the step of selecting is performed by determining resistance against an antibiotic.

83. (Withdrawn) A method for expressing a foreign gene in a rice plant seed, comprising the steps of:

providing the nucleic acid molecule according to Claim 1;

providing a nucleic acid encoding the foreign gene;

introducing the nucleic acid molecule according to Claim 1 and the nucleic acid encoding the foreign gene into a cell of the rice plant;

redifferentiating the cell to produce a transgenic rice plant; and

obtaining a seed from the transgenic rice plant.

84. (Withdrawn) The method according to claim 83, wherein the step of introducing is performed by Agrobacterium method.

85. (Withdrawn) The method according to claim 83, further comprising the step of selecting a plant cell with the nucleic acid molecule introduced.

86. (Withdrawn) The method according to claim 85, wherein the step of selecting is carried out by determining resistance of the plant cell against an antibiotic.

87. (Withdrawn) The method according to claim 83, further comprising the step of separating a gene product of the foreign gene from the seed.

88. (Withdrawn) A composition comprising a gene product of the foreign gene produced by the method according to claim 83.

89. (Withdrawn - Currently amended) Use of a nucleic acid molecule according to claim 1 for reducing expression amount of a protein in a seed of a rice plant.

90. (Withdrawn) Use of a nucleic acid molecule according to claim 1 for expressing a foreign gene in a seed of a rice plant.

91. (Withdrawn) Use according to claim 90, wherein the expression of native proteins of the plant in the rice seed is reduced.